

## Semi Automatic Manhole Cleaner

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**Abstract** - Drainage systems and its role in sanitation related outbreaks are evident but still occluded once it has been installed. Improper management of drain line led to chronic diseases. To ensure adequate safe hygiene, this will help to clean drain line in superior manner that will help to maintain public hygiene. This project automatically cleans the water in the drainage system is time any wastage appears and this form and efficient & easy way of cleaning the drainage system and preventing the blockage.

**Key Words:** *Semi Automatic, Manhole Cleaner, Locking System-Sliding Mechanism.*

### 1. INTRODUCTION

India is vast country with a fast growing population, the increase of population leads to adopt so keeping this in mind we have presented a new design methodology of drainage cleaner. Uncovered manholes and open drains are a regular feature and a common sight on Indian roads. Neither the big metropolitan cities nor the small towns and villages are spared. While the increasing number of fatal accidents caused by these open drains has become a major concern for the pedestrians and residents, the civic authorities appear unfazed. Despite repeated incidents, the government has refused to learn any lesson and failed to take precautionary measures. Thus the drains continue to remain open, and innocent lives continue to be lost. Cleaning these open drains and manholes need strong team of cleaners and sweepers. They enter in manholes and drainages. While cleaning, many a times cleaners face accidents. Such a case of accident was happened in Chandigarh, sector 47.3 workers died in the accident. The drain in which workers entered was full of waste and it was completely clogged. They died due suffocation. If the drain had been cleaned regularly then the amount waste to be removed by worker may be less. According to police report, the drain had more waste than its capacity. Ignorance is the main reason accident. This and many accident had been evidenced by Indian metropolis. In the fast moving world, technology is penetrating into rural areas, use of various machines, mobile communication etc. If this technological penetration is made into the municipal department of cleaning, it may be a revolutionary thing. One of such attempt is made through this project which is a motor operated drainage cleaner. A drainage cleaner device is use in the drainages for extracting the solid waste material which flows along with water and which would choke the drainage system further. These machine works on the power generated by DC motor.

### 2. LITERATURE REVIEW

**Table no 1:** literature review

System and Scientists	Outcome	Drawbacks
Program logic control (JIANG JING AND ZHANG XUESONG(2014)	Automatic control of sewage treatment	It is not depend on deposited sludge of the drainage system
AKIO GOTO AND KAZUYUKI YAMASAKI (2014)	By using of microorganisms produced the toxic gases and not toxic gases	Gases effect on human beings
Drainage pump monitoring and control system (WU JINGCHEN, GUOJIE2014)	Collection of operation parameters of underground drainage pump and automatic control start up and shutdown of drainage pump	It does not gives the problem solving procedure
Wireless real time system YIN HALING XU ZUXIN(2014)	In this defined only for the monitoring of the drainage system	It does not define how to control the drainage water
Wireless real time observation system WANG JUAN (2014)	It shows how to control storm drainage so as to reduce dry weather pump discharging	-

### 3. METHODOLOGY

The device is place in a manhole so that only water flows through the lower basement. Floating waste like bottles, plastic cans, covers....etc. is lifted by lifters which are connected to the chain. The chain revolves with the sprocket wheel which is driven by the motor. The energy provided to the motor is electrical energy. When motor runs the chain starts to circulate making the lifter to lift up. The wastage material are lifted by lifter teeth and stored in storage or collecting bin. Once the collecting bin is full, the waste materials are removed from the bin.

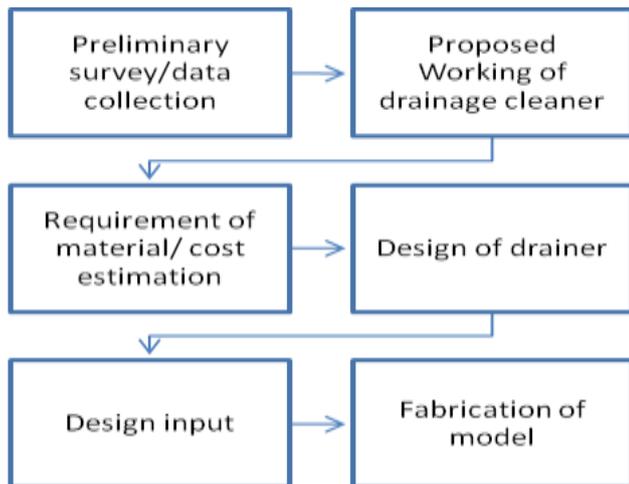


Fig No 1: Flow Chart of Methodology

### 3.1 Design Consideration

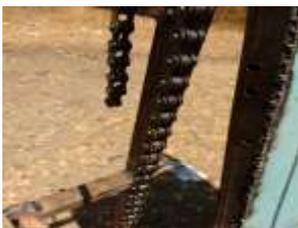
#### 3.1.1 Material used

##### 1. Sprocket Wheel

A sprocket or Sprocket-Wheel is a profiled wheel teeth, cogs or even sprockets that mesh with chain, track or other perforated or indented material. The name sprocket applies generally to any wheel upon which radial projections engage a chain passing over it. It is distinguished from a gear in that sprocket are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulley are smooth.

##### 2. Chain

A chain is a series of connected links which are typically made of metal. A chain may consist of two or more links. Those designed for lifting for such as when used with hoist; for pulling or for securing such as with bicycle lock, have links that are porous shaped, which make the chain flexible in two dimensions.



##### 3. D.C. Motor

A DC motor is an electrical machine that converts direct current electrical power to mechanical power. The most common types rely on the forces produce by magnetic fields. Nearly all types of DC motor have some internal mechanism, either electro mechanical or electronic to periodically change the direction of current flow in the



part of motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.

#### 4. BATTERY

In today's life batteries are all around us. They power our wristwatches for months at a time. They keep our alarm clocks and mobile phones working even if the electricity goes out. We generally use two types of batteries; one of them is which can be used once before it gets totally discharged. Another type of battery is rechargeable which means it can be used multiple times b recharging it externally. The former is called primary battery and the later one is called secondary battery. Batteries can be found in different sizes. a battery may be as small as shirt button or may be so big in size that whole room will be required to install a battery bank .with this variation of sizes , the battery is used anywhere from small wrist watches to a large ship.

#### 5. CAST IRON

Cast iron is a group of iron-carbon alloys with carbon content greater than 2%. The alloy constituents affect its color when fractured. Cast iron tends to be brittle, except for malleable cast irons. With its low melting point, good fluidity, cast ability, excellent mechanism, resistance to deformation and wear resistance, cast irons have become an engineering material with a wide range of application and are used in pipes, machines and automotive industry parts, such as cylinder heads, cylinder blocks and gearbox cases. It is also resistant to destruction and weakening by oxidation.

#### 6. ALUMINIUM



Aluminum is remarkable for the metals low density and for its ability to resist corrosion due to the phenomenon of passivation. Structural components made from aluminum and its alloy is vital to the aerospace industry and important in other areas of transportation and structural materials, such as building facades and window frames.

Aluminum is relatively soft, durable, light weight, ductile and malleable metal with appearance ranging from silver to dull gray.

#### 7. SHAFTS



Shaft is a rotating machine element used to transmit power. In our project shaft is fixed in between two pedestal bearing to transmit the motion of sprocket wheel along with chain, to lift the floating waste material and collect in a box. Two shafts are fixed on

the acutely inclined frame for the proper lifting of garbage material. We use the shaft which is made of Mild Steel.

### 8. PEDESTAL BEARING



A bearing is a machine element that constrains relative motion to only the desired motion and reduces friction between moving parts. The design of the bearing may, e.g., provide for free linear movement of the moving part or for free rotation around the fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Many bearings also facilitate the desired motion as much as possible, such as by minimizing friction. Bearings are classified according to the type of operation, the motions allowed, or to the directions of the loads applied to the parts.

3.1.2. Working

- The design of drainages is changing day by day. Now a day's closed type drainages are constructed with small opening. The automatic drainage cleaner is placed in the manhole or opening of drainages or in open type drainages.
- After placing the unit, we have to turn on the electric supply of motor. Motor drives the conveyer system. The drain water flows below the unit and the conveyer arrangement obstruct flowing waste.
- Motor drives the Driving shaft and ultimately run the conveyer arrangement. The tray on conveyer rotates continuously. When tray comes down, it lifts up the solid waste. Tray slowly moves upwards with waste in it. When tray reaches the upper portion of unit, it flips off and the waste is dumped into the dustbin box.

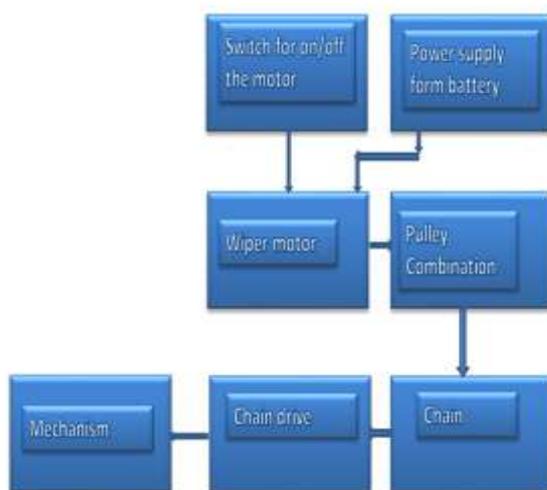


Fig No 2: Working Flowchart

### 3.1.3 Frame of model

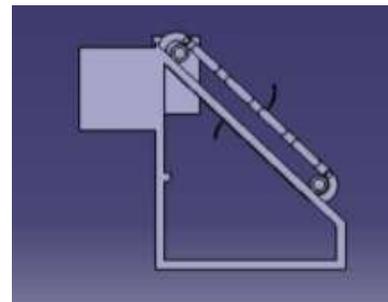


Fig No 3: Concept model



Fig No 4: Actual Model

### 4. ADVANTAGES

- Maintenance of unit is easy due to its slide locking system (sliding mechanism).
- These cleaners are easy cheapest way to fix drainage problems. Easy to operate as no special skill is required.
- These cleaner replace the manual work in drainage cleaning by mechanical drain cleaner.
- Large amount of garbage will collect which can be re-manufacturable.
- It reduces the load of sewage treatment plant.

### 5. DISADVANTAGES

- Working of cleaner in a full drain condition cannot be predicted.
- It gets corrugated if not maintained periodically.

### 6. CONCLUSION

The proposed system is helpful in handling the blockage of manhole in effective manner. As whole system is providing solution over the total cleaning of drain line not only floating material but also waste accumulates at the bottom of drain. In India, cleanliness is major issue regarding health and society. So as to provide a step in we design such system which will help to have clean society. It will also helpful in future for growing economy of Municipal Corporation.

**7. REFERANCES**

- 1) *International Refereed Journal of Engineering and Science (IRJES) ISSN (Online) 2319-183X, (Print) 2319-1821 Volume 3, Issue 3(March 2014), PP.54-60.*
- 2) *International journal of innovative research in technology 2014 IJIRT Volume 1 Balachandra.G1,Karthikeyan.S2, Elangovan.K3, and Divya.N4.1,2,3B.E/EEE Final year, Knowledge Institute of Technology, Salem, India* Assistant professor, Department of EEE, Knowledge Institute of Technology, Salem, India.
- 3) *Theory of machines –S S Rattan Department of Mechanical .Engineering Regional Engineering College Kurukshetra (2004). Publication: Tata McGraw-Hill Publishing Company Limited.*
- 4) *Design of machine elements (DME-II) by K Raghavendra. First edition 2015.*
- 5) *Design and Data hand book for Mechanical Engineers by K Mahadevan and K Balaveera Reddy. Fourth edition 2013.*
- 6) *Department of Civil Engineering Michael Okpara University of Agriculture Umudike Abia State March 2014.*
- 7) *NDUBUISI C. Daniels, "Drainage System Cleaner A Solution to Environmental Hazards", International Refereed Journal of Engineering and Science, Vol No- 3, March 2014.*
- 8) *Nitin Sall, et.al., "Drain Waste Water Cleaner", Global Journal of Researches in Engineering: J General Engineering Vol No- 16, 2016.*

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